

Observations on the breeding biology of birds in south-east Ecuador

by Harold F. Greeney, Mery E. Juiña J., J. Berton C. Harris,
Michael T. Wickens, Ben Winger, Rudy A. Gelis, Eliot T. Miller &
Alejandro Solano-Ugalde

Received 6 August 2009

SUMMARY.—Despite many years of ornithological exploration in Ecuador, we are still far from understanding avian nesting seasonality at a countrywide level. Similarly, many birds have only one, or very few, published accounts of their breeding. Here we present data on the reproduction of 66 species from south-east Ecuador, gathered opportunistically between 2004 and 2008.

Whilst Freile *et al.* (2006) noted the relative paucity of information published on the birds of mainland Ecuador during the 20th century, recent years have seen a dramatic increase in the amount of published data on the breeding biology of Ecuador's avifauna. In particular, several important works have recently provided information for hundreds of species, often the first available data for Ecuador, from both the north-west (Marín & Carrión 1994, Greeney & Nunnery 2006, Arcos-Torres & Solano-Ugalde 2007, Solano-Ugalde *et al.* 2007) and the north-east (Greeney *et al.* 2004, Greeney & Gelis 2007, 2008). Breeding biology in Ecuador's south-west has also been fairly well documented, and shows well-defined seasonality (Marchant 1959, 1960, Best *et al.* 1993, 1996). Other than a few scattered studies of individual species (e.g., Schulenberg & Gill 1987, Rasmussen *et al.* 1996, Greeney & Rombough 2005, Greeney *et al.* 2007, Juiña *et al.* 2009), however, the south-east has been relatively neglected. Nonetheless, recent reassessments of current knowledge indicate that, despite Greeney *et al.*'s (and others) recent efforts, information is still mostly anecdotal and many species are still undocumented (possibly still more unstudied than studied).

Here we present breeding data for 66 bird species from the area around Tapichalaca Reserve (TBR, 04°30'S, 79°10'W), north of Valladolid, and adjacent to Podocarpus National Park, in south-east Zamora-Chinchipe Province. We gathered records opportunistically during field work in 2003–08, and include records from lower elevations along the Quebrada Honda as well as in the vicinity of the small town of Tapala. Thus, while most of our observations are centred on the TBR, at 2,500 m, we present data from 1,100–2,700 m in this area. For nests where we were able to gather significant amounts of data we describe our observations individually. Otherwise we present breeding records in the following condensed form: species, date, elevation, any incidental notes (nest status). Nest status is indicated by one of the following abbreviations: (B) building; (L) laying, incomplete clutch; (I) incubation; (N) nestling; (F) fledgling; and (AN) active nest of unknown stage.

Species accounts

SPOTTED BARBTAIL *Premnoplex brunnescens*

On 8 October 2004 we found an empty but intact nest at 2,500 m. On 11 October we flushed the adult from the nest, at which time it contained a single all-white egg which measured 22.5 × 17.0 mm and weighed 3.56 g. The nest was 1.4 m above a steep mountain stream and affixed into a dense clump of epiphytes and moss hanging from a large tree. We found a

second nest on 9 October 2004, at 2,300 m, at which time it also contained a single all-white egg. The egg measured 23.0 × 17.0 mm. The nest was 2 m up, directly over a stream and built into a shallow depression on a rock face. The first nest faced a compass direction of 125° whilst the second was oriented 215°. Following the pattern described by Greeney (2009), however, the first was oriented directly upstream from the flow of the water and the second was oriented perpendicular to the flow of the water below the nest. This illustrates that this unique, and still unexplained, pattern of nest orientation is not confined to the population studied in north-east Ecuador. We found an additional nest with two nestlings on 13 October 2006 at 2,400 m. All nests showed similar architecture and variation in nest placement as described for this species in north-east Ecuador (Greeney 2008a) and eggs were similar to those described from elsewhere in Ecuador (Marín & Carrión 1994, Greeney & Nunnery 2006, Greeney & Gelis 2007, Greeney 2008b).

SLATE-CROWNED ANTPITTA *Grallarica nana*

G. Mendoza found a nest with an egg on 28 October 2006 at 2,550 m; the egg hatched on 29 October. We measured and weighed the nestling from 2–10 November (Table 1). We also recorded parental care with a video camera for 16.3 hours on 5–8 November (7–10 days after hatching; 9.2 hours during the morning and 7.1 hours in the afternoon). The nestling was fed at a mean rate of 2.2 feeds / hour, and an average of 0.98 faecal sacs were removed per hour, all of which were eaten by the adults at the nest. The adults vibrated the nest 1.04 times / hour, leaning into the nest and rapidly moving their bill in and out of the lining in a sewing machine-like fashion (rapid probing *sensu* Greeney *et al.* 2008a). The adults delivered 36 food items to the nestling comprising 21 small unidentified items, nine worms (Oligochaeta), three Lepidoptera larvae, two adult beetles (Coleoptera) and one wasp (Hymenoptera). On 13 November we found the decapitated body of the nestling in the nest. The nest, egg, nestling and parental care were similar to previous observations of this species (Greeney & Sornoza 2005, Greeney & Miller 2008), with the exception that faecal sacs were consumed by the adults at the nest, probably because the nestling was younger in the present study.

BLACKISH TAPACULO *Scytalopus latrans*

We flushed an adult from a nest on the ground on 19 August 2007 at 2,500 m and felt two eggs were in the nest at this time. We visited the nest every 1–3 days, and observed an adult carrying food to the nest for the first time on 28 August. From 28 August to 7 September we visited the nest every 1–2 days, observing it each visit for 1.5–3.5 hours. Two adults brought food to the nest. Nestling begging calls could be heard for the first time on 2 September. After a 30-minute observation period on 8 September with no activity, we inspected the nest, and found it to be empty and intact. In addition to this nest, we found another with two nestlings on 15 September 2007 at 2,450 m, and observed fledglings on 30 October 2007 at 2,440 m. Our brief observations agree with those of other authors (Skutch 1972, Greeney *et al.* 2005a, Greeney 2008c).

TABLE 1
Measurements of a nestling Slate-crowned Antpitta *Grallarica nana* from Tapichalaca, Ecuador. * = not measured.

Days after hatching	Mass (g)	Wing (mm)	Tarsus (mm)
4	8.5	10	13
5	9	11	14
6	10	12	15
7	11.5	12.5	16
8	12.5	14	*
9	12.5	16	18
10	14	16	20
11	15.5	17	21
12	17	19	22

CHUSQUEA TAPACULO *Scytalopus parkeri*

We found a nest on 2 August 2007, at 2,500 m. The nest was built inside a natural earthen cavity next to a stream, 2.5 m up a bank, 4.2 m away from the streambed. On 3 August the nest contained two all-white eggs. We checked the nest contents on 13 and 15 August; both times the nest still contained two eggs. On 17 August both eggs had hatched and we estimated the nestlings to have been c.2 days old. We visited the nest every 1–2 days thereafter. During these observations, an adult Lepidoptera, a centipede (Chilopoda) and other unidentified invertebrates were delivered to the nestlings. At times, two adults were present at the nest simultaneously. We last observed the nestlings on 22 August, and by 24 August the nest had been depredated. We found an additional nest with two eggs on 15 November 2006 at 2,600 m. We also observed an adult carrying material to a nest on 25 September 2007 at 2,550 m, found another on this date under construction at 2,400 m, and observed fledglings on 27 February 2007 and 1 November 2007, at 2,500 m and 2,450 m, respectively. These data agree with the scant information published for this poorly known tapaculo (Greeney & Rombough 2005, Greeney 2008c, Greeney & Krabbe 2009).

CINNAMON FLYCATCHER *Pyrrhomyias cinnamomea*

On 7 October 2004, at 2,600 m, we found a nest containing two fresh eggs. They measured 18.1 × 13.6 and 18.3 × 13.8 mm and weighed 1.63 and 1.66 g, respectively. Both eggs were white, densely spotted red-brown, most heavily at the larger end. On 17 October the nest contained a single nestling weighing 1.38 g, suggesting it had hatched that day. The nest was built in a small, sheltered niche, 2.6 m up on a rock ledge. It was a shallow, unlined cup of dry moss. On 19 October heavy rains caused the collapse of the bank above the nest and it was destroyed. We discovered an additional nest with two eggs on 14 September 2007 at 2,550 m and a third nest with two nestlings on 29 November 2004 at 2,550 m. Both of these nests were also on rock faces and were similar in form to that described above. All nests and eggs were similar to those described by Collins & Ryan (1995) from Venezuela.

WHITE-SIDED FLOWERPIERCER *Diglossa albilatera*

On 14 October 2004, at 2,600 m, we flushed a female from a nest containing two eggs. The eggs were pale blue with cinnamon freckling, heaviest at the larger end. They measured 17.7 × 13.5 and 17.7 × 13.2 mm and weighed 1.70 and 1.60 g, respectively. The nest was a neat cup built into a vine tangle 1.7 m above the ground. It was composed externally of bamboo leaves, petioles and small sticks woven together with moss. The egg cup was lined predominantly with *Usnea* sp. moss mixed sparsely with red-brown tree-fern scales (*Cyathea* sp.) and pale fibres. Externally the nest was 11 cm wide × 7 cm tall with internal measurements of 4 cm diameter × 4 cm deep. When we returned 14 days later the nest was empty. Additionally we saw a pair with a dependent fledgling on 2 November 2004 at 2,600 m. The nest and eggs were similar to those previously described (Sclater & Salvin 1879).

SPECTACLED REDSTART *Myioborus melanocephalus*

We observed an adult carrying nest material on 31 July 2007 and subsequently discovered a nest with two eggs in this area on 16 August 2007. The nest was on a gently sloping hillside c.2 m above a trail at 2,500 m. We visited the nest every 1–3 days. Both eggs hatched around 22 August, but on 3 September the nest was empty. The internal chamber of this nest was 8.2 cm high and the internal measurements of the egg cup were 6.5 cm wide × 2.9 cm deep. We found three additional nests with two eggs on 20 September 2006 at 2,500 m, on 31 October 2006 at 2600 m, and 12 October 2007 at 2,400 m. On 31 October 2006, at 2,550 m we found a nest with two nestlings. We discovered another nest under construction at 2,550

m on 26 August 2007 and two additional nests under construction on 18 September 2007 at 2,400 m and 2,500 m. These nests were all similar in placement and architecture to those described by Greeney *et al.* (2008b), who also included nesting data from this area.

BLACK-CRESTED WARBLER *Basileuterus nigrocristatus*

On 6 November 2004 we found a nest with a single egg at 2,650 m. We flushed the adult and noted that the egg was warm but slightly damaged and appeared to be rotting. We visited the nest on subsequent days and always found the egg to be cold, apparently abandoned. The egg was white with red-brown flecking forming a ring at the larger end. It measured 20.5 × 14.6 mm. The nest was globular, domed and built 1.2 m up in a small cavity on a rocky cliff face. It was composed externally of moss mixed sparsely with rootlets and bamboo leaves. The inner cup lining was composed of two portions: an outer portion of tightly compacted dry moss and an inner portion of soft, hair-like reddish tree-fern ramenta (*Cyathea* sp.). Externally it measured 17 cm wide × 15 cm tall and had a lateral entrance 6 cm wide × 4 cm tall. There was a 12-cm lip of moss and leaves below the opening. Internally, the nest chamber was 8 cm tall with the egg cup measuring 5.5 cm wide × 4.0 cm deep. We also observed this species with dependent fledglings on 27 November 2003 (2,600 m) and on 5 November 2007 (2,600 m).

The nest described here is remarkably different in composition to the only well-described nests of this species (Greeney *et al.* 2005b), which were almost entirely composed of dead, dry bamboo leaves (or grasses), with no well-differentiated lining. Thomas K. Salmon (*in* Sclater & Salvin 1879) also described nests built uniformly of dried materials. Whilst the nests described in Sclater & Salvin (1879) were also tucked into cavities, others (Guerrero 1996, Greeney *et al.* 2005b) have described nests suspended low in vegetation. The identification of the adult seen leaving the nest on our first visit is fairly certain, and it remains to be seen how much variation in nest placement and composition is displayed by this species. Until then, we suggest that this description be used with caution.

RUSSET-CROWNED WARBLER *Basileuterus coronatus*

On 28 October 2004, at 2,600 m, we found a nest with two white eggs with red-brown flecking and speckling. They measured 22.7 × 15.4 and 22.2 × 15.4 mm, and weighed 2.86 and 2.76 g, respectively. We revisited the nest every two days and weighed the eggs on 30 October and 1 November, noting that both were developing. During this period the eggs lost 0.87 and 1.06% of their original mass per day, respectively. On 3 November we found egg shells several metres from the nest, apparently eaten by a predator. The nest was built into a natural niche 0.25 m up on a bank beside a small trail. It was a globular ball of dead leaves and moss with an inner cup of two layers. The first layer was of loosely compacted tree-fern ramenta (*Cyathea* sp.). The second (inner) comprised tightly woven pale fibres and a few tree-fern ramenta. Externally the nest measured 11.5 cm wide × 15.0 cm tall and had a lateral opening which measured 6.5 cm wide × 7.0 cm tall. There was an 8-cm lip of material extending outward below the entrance. The inner chamber was 10 cm tall overall with the egg cup measuring 5.5 cm wide × 3.5 cm deep, internally.

On 30 October 2004 we found a second nest at 2,500 m, which also contained two partially developed eggs similar to those described above, measuring 20.4 × 14.7 and 20.9 × 14.7 mm, and weighing 2.26 and 2.32 g, respectively. We weighed them at this time and again on our second visit on 7 November. The eggs lost mass at a rate of 1.31 and 1.22% / day, respectively. On our final visit on 16 November the nest was empty. The nest was built in a similar situation to the first, 1 m up on a small bank. Externally it was similarly composed of moss and dead leaves but the internal egg cup was slightly different. While

still composed of two distinct layers, the first (outer) contained fewer tree-fern ramenta than in the first nest, and included some pale fibres similar to those comprising the entire inner layer of this nest's cup. Externally the nest measured 13 cm wide \times 18 cm tall with an internal height of only 8 cm. The cup measured 7 cm in diameter internally and was 4 cm deep. The lateral entrance measured 6 cm wide by only 3 cm tall. There was a 6.5-cm lip of material extending outward below the entrance. Compared to the first nest, it was more completely formed dorsally, while at the first nest the 'roof' was only partially constructed and was instead partially formed in part by the naturally overhanging portion of the cavity in which it was placed. This difference is reflected by the differences in nest opening heights.

On 16 August 2007 we found a nest with two eggs 0.8 m up on a slope above a small trail at 2,500 m. We visited the nest every 1–3 days to check on its contents. Both eggs hatched around 22 August. Between 26 and 27 August, however, the nest was destroyed. On 26 August, while the nest contained two young nestlings, an adult flushed and performed a broken-wing display in front of the observers. The nest cup measured 7.5 cm \times 5.1 cm. We found three additional nests, each with two eggs, on 17 September 2006, 14 October, and 14 November 2006, at 2,600 m, 2,350 m and 2,500 m, respectively. We found nests, each with two nestlings, on 3 October 2006 and 31 October 2006, at 2,400 and 2,550 m, respectively. The nests described here are very similar in composition, architecture and placement to those of the only other well-described nest of this species (Greeney *et al.* 2005b).

YELLOW-BILLED CACIQUE *Amblycercus holosericeus*

On 1 December 2003 we found a nest at 2,500 m. It was a deep cup of dead bamboo leaves woven together with a few rootlets and vine tendrils. It was sparsely lined with dark rootlets and was attached on three sides to vertical bamboo shoots, 3.5 m above the ground. Externally the nest measured 13.5 cm in diameter and 9.0 cm tall. The inner portion was 7.5 cm wide \times 4.0 cm deep. Adults brought large, single prey items including a katydid (Tetigoniidae) and a large walking stick (Phasmoda). Two days after discovery both chicks successfully fledged. Additionally we saw a dependent fledgling on 15 March 2007 at 2,400 m. The nest was similar in placement and construction to the only other described Ecuadorian nest (Greeney *et al.* 2008b), as well as to those described from Costa Rica (Skutch 1954).

Additional records

We also documented the following breeding information: **Bearded Guan** *Penelope barbata*, 26 June 2007, 2,800 m (F), 14 October 2008, 2,600 m (F); **White-eyed Parakeet** *Aratinga leucophthalma*, 29 March 2007, 1,400 m, several pairs entering cavities on cliff face (AN); **Green-fronted Lancebill** *Doryfera ludovicae*, 13 June 2006, 1,750 m, 2 eggs (I); **Amethyst-throated Sunangel** *Heliangelus amethysticollis*, 29 August 2007, 2,500 m, 2 m above ground on the underside of a fern leaf, contained 2 eggs on 9 September (B); Little Sunangel *H. micraster*, 2 November 2006, 2,500 m (F); **Collared Inca** *Coeligena torquata*, 9 August 2005, 2,500 m (F), 29 October 2007, 2,470 m (F); **Crimson-mantled Woodpecker** *Colaptes rivolii*, 8 October 2004, 2,600 m (AN); **Rufous Spinetail** *Synallaxis unirufa*, 1 December 2003, 2,600 m (F), 25 April 2007, 2,500 m (F), 22 August 2007, 2,500 m (B); **Pearled Treerunner** *Margarornis squamiger*, 6 November 2004, 2,500 m (F), 4 November 2006, 2,600 m (F); **Striped Treehunter** *Thripadectes holostictus*, 20 September 2007 (2 AN at 2,300 m and 1 N at 2,150 m); **Olive-backed Woodcreeper** *Xiphorhynchus triangularis*, 27 June 2007, 1,800 m (N); **Lined Antshrike** *Thamnophilus tenuipunctatus*, 16 January 2009, 1,400 m (AN); **Long-tailed Antbird** *Drymophila caudata*, 26 November 2004, 2,150 m (F); **Chestnut-naped Antpitta** *Grallaria nuchalis*, 18 October 2007, 2,430 m (F), 31 October 2007, 2,350 m (F);

Rufous Antpitta *G. rufula*, 27 September 2007, 2,650 m (B), 27 September 2007, 2,550 m, 2 eggs (I), 29 October 2007, 2,450 m (F), 4 November 2008, 3,000 m, 2 nestlings (N); **Mottle-backed Elaenia** *Elaenia gigas*, 2 February 2007, 1,100 m (AN); **White-tailed Tyrannulet** *Mecocerculus poecilocercus*, 28 November 2004, 2,300 m (F); **White-banded Tyrannulet** *M. stictopterus*, 27 June 2007, 2,450 m (B); **Rufous-headed Pygmy Tyrant** *Pseudotriccus ruficeps*, 25 February 2007, 2,450 m (F), 26 February 2007, 2,700 m (F), 16 January 2009, 2,600 m (F); **Streak-necked Flycatcher** *Mionectes striaticollis*, 23 April 2007, 2,400 m (F); **Rufous-breasted Flycatcher** *Leptopogon rufipectus*, 26 November 2004, 2,200 m, 2 nestlings (N); **Black-throated Tody-Tyrant** *Hemitriccus granadensis*, 5 November 2007, 2,470 m (F); **Rufous-crowned Tody-Flycatcher** *Poecilotriccus ruficeps*, 9 October 2004, 2,280 m, 3 m up on tip of bamboo shoot (B), 27 July 2007, 2,500 m (B), 2 August 2007, 2,500 m (B); **Common Tody-Flycatcher** *Todirostrum cinereum*, 9 October 2006, 1,600 m (B); **Orange-banded Flycatcher** *Myiophobus lintoni*, 6 April 2006, 2,550 m (F), 26 October 2006, 2,550 m (F), 2 November 2006, 2,550 m (F); **Bran-coloured Flycatcher** *M. fasciatus*, 6 April 2006, 1,150 m (B); **Black Phoebe** *Sayornis nigricans*, 9 October 2004, 1,800 m, 2 nestlings, 3.5 m up (N); **Yellow-bellied Chat-Tyrant** *Ochthoeca diadema*, 13 October 2006, 2,700 m, 2 eggs (I); **Rufous-breasted Chat-Tyrant** *O. rufipectoralis*, 25 November 2003, 2,600 m (F); **Green-and-black Fruiteater** *Pipreola riefferii*, 23 April 2007, 2,450 m (B), 26 June 2007, 2,400 m (N); **Chestnut-crested Cotinga** *Ampelion rufaxilla*, 10 May 2007, 2,350 m, 2 nestlings (N), 11 May 2007, 2,300 m (AN); **Barred Becard** *Pachyrhamphus versicolor*, 24 August 2007, 2,450 m (B), 29 October 2006, 2,550 m (F); **Turquoise Jay** *Cyanolyca turcosa*, 2 December 2003, 2,650 m, one adult sitting on nest and fed by second adult, nest 15 m up (AN), 26 October 2007, 2,350 m, 3 adults attending 2 chicks in nest 20 m up over small stream (N); **Blue-and-white Swallow** *Pygochelidon cyanoleuca*, 26 September 2007, 2,550 m (I); **Mountain Wren** *Troglodytes solstitialis*, 26 August 2007, 2,515 m (B); **Plain-tailed Wren** *Thryothorus euophrys*, 26 November 2003, 2,550 m, 2.5 m up in bamboo thicket (B), 25 October 2006, 2,500 m (B), 4 November 2007, 2,450 m, ball with a side entrance, mostly of bamboo parts, 2.5 m above ground in patch of bamboo, 3 nestlings (N); **Rufous Wren** *Cinnycerthia unirufa*, 13 October 2004, 2,500 m (F), 1 November 2004, 2,550 m (F), 28 November 2004, 2,550 m (F), 7 August 2005, 2,500 m (F), 20 October 2005, 2,550 m (F), 5 November 2007, 2,500 m (F); **Grey-breasted Wood Wren** *Henicorhina leucophrys*, 26 November 2004, 2,200 m (I), 26 November 2004, 2,100 m (N); **Great Thrush** *Turdus fuscater*, 28 June 2007, 2,650 m, 2 nestlings (N); **Black-capped Hemispingus** *Hemispingus atropileus*, 29 November 2003, 2,600 m (F); **Black-eared Hemispingus** *H. melanotis*, 7 October 2006, 2,390 m (F), 23 April 2007, 2,400 m (F), 22 May 2007, 2,400 m (F); **Grass-green Tanager** *Chlorornis riefferii*, 26 November 2003, 2,550 m, adult fed fledgling a small fruit (F); **Buff-breasted Mountain Tanager** *Dubusia taeniata*, 1 December 2003, 2,550 m, prey loading, carrying prey repeatedly to same area, including 2.5-cm-long Saturniidae caterpillar gleaned from bamboo (CF); **Bluish Flowerpiercer** *Diglossa caeruleascens*, 4 April 2006, 2,500 m (N); 27 June 2007, 1,800 m (B); **Masked Flowerpiercer** *D. cyanea*, 12 October 2004, 2,550 m (F), 15 August 2005, 2,600 m, 5 m up in epiphyte clump (I), 4 April 2006, 2,450 m, 1 nesting (N), 4 April 2006, 2,500 m (F), 27 June 2007, 2,500 m (B); **Common Bush Tanager** *Chlorospingus ophthalmicus*, 15 October 2006, 2,450 m (B); **Short-billed Bush Tanager** *C. parvirostris*, 26 November 2004, 2,350 m (N); **Fawn-breasted Tanager** *Pipraeidea melanonota*, 24 June 2007, 1,850 m (N); **Flame-faced Tanager** *Tangara parzudakii*, 12 May 2007, 2,250 m (N); **Black-faced Tanager** *Schistochlamys melanopis*, 16 January 2009, 1,100 m (AN); **Citrine Warbler** *Basileuterus luteoviridis*, 26 October 2007, 2,450 m (F); **Rufous-collared Sparrow** *Zonotrichia capensis*, 1 December 2003, 2,500 m (F); **Yellow-browed Sparrow** *Ammodramus aurifrons*, 6 April 2006, 1,200 m (B); **Slaty Finch** *Haplospiza rustica*, 12 August 2005, 2,600 m (2 B), 14 September 2006, 2,450 m (1 I and 1 N), 26 September 2006, 2,650 m (1 B and 1 I); **Chestnut-**

capped Brush Finch *Arremon brunneinucha*, 16 August 2005, 2,650 m (N); **Yellow-breasted Brush Finch** *Atlapetes latinuchus*, 28 November 2003, 2,550 m (F), 26 September 2006, 2,530 m, 2 eggs (I), 26 September 2006 2,550 m, 1 egg (L), 26 October 2006, 2,500 m (F), 24 August 2007, 2,500 m (B), 14 October 2007, 2,450 m (F); **Pale-naped Brush Finch** *A. pallidinucha*, 28 November 2003, 2,650 m (F), 12 August 2005, 2,650 m (B), 9 October 2006, 2,700 m (F).

Acknowledgements

We thank the Jocotoco Foundation for graciously providing accommodations while working at Tapichalaca. Geovanny & Vicente Mendoza gave valuable assistance in the field, and Pedro Álvarez and the Tapichalaca park guards provided logistical support throughout. HFG thanks the Maryland Ornithological Society, the Population Biology Foundation, John V. & the late Ruth Ann Moore, as well as Matt Kaplan, for generously supporting his field studies. Writing of this manuscript was accomplished while HFG, RAG and AS-U were supported by National Geographic grant #W38-08. All authors are grateful for the continuing support of the PBNHS. We thank Guy Kirwan and Juan Freile for helpful comments on earlier versions of this manuscript. This is publication no. 198 of the Yanayacu Natural History Research Group.

References

- Arcos-Torres, A. & Solano-Ugalde, A. 2007. Notas sobre la anidación de tres especies del género *Tangara* (Thraupidae: Aves) en el noroccidente de Ecuador. *Bol. Soc. Antioqueña Orn.* 17: 133–137.
- Best, B. J., Checker, M., Thewlis, R. M., Broom, A. L. & Duckworth, W. 1996. New bird breeding data from southwestern Ecuador. *Orn. Neotrop.* 7: 69–73.
- Best, B. J., Clarke, C. T., Checker, M., Broom, A. L., Thewlis, R. M., Duckworth, W. & McNab, A. 1993. Distributional records, natural history notes, and conservation of some poorly known birds from southwestern Ecuador and northwestern Peru. *Bull. Brit. Orn. Cl.* 113: 108–119, 234–255.
- Collins, C. T. & Ryan, T. P. 1995. The biology of the Cinnamon Flycatcher *Pyrrhomyias cinnamomea* in Venezuela. *Orn. Neotrop.* 6: 19–25.
- Freile, J. F., Carrión, J. M., Prieto-Albuja, F., Suárez, L. & Ortiz-Crespo, F. 2006. La ornitología en Ecuador: un análisis del estado actual del conocimiento y sugerencias para prioridades de investigación. *Orn. Neotrop.* 17: 183–202.
- Greeney, H. F. 2008a. Nest construction behavior and variability in nest architecture and nest placement of the Spotted Barbtail (*Premnoplex brunnescens*). *Bol. Soc. Antioqueña Orn.* 18: 26–37.
- Greeney, H. F. 2008b. The Spotted Barbtail (*Premnoplex brunnescens*): a review of taxonomy, distribution, and breeding biology, with additional observations from northeastern Ecuador. *Bol. Soc. Antioqueña Orn.* 18: 1–9.
- Greeney, H. F. 2008c. Additions to our understanding of *Scytalopus* tapaculo reproductive biology. *Orn. Neotrop.* 19: 463–466.
- Greeney, H. F. 2009. Nest orientation in the Spotted Barbtail, *Premnoplex brunnescens*, is strongly correlated with stream flow. *J. Ethology* 27: 203–208.
- Greeney, H. F. & Gelis, R. A. 2007. Breeding records from the north-east Andean foothills of Ecuador. *Bull. Brit. Orn. Cl.* 127: 236–241.
- Greeney, H. F. & Gelis, R. A. 2008. Further breeding records from the Ecuadorian Amazonian lowlands. *Cotinga* 29: 62–68.
- Greeney, H. F. & Krabbe, N. 2009. Chusquea Tapaculo *Scytalopus parkeri*, Neotropical Birds Online. In Schulenberg, T. S. (ed.) Cornell Lab of Ornithology, Ithaca, NY. http://neotropical.birds.cornell.edu/portal/species/overview?p_p_spp=44072.
- Greeney, H. F. & Miller, E. T. 2008. The nestling and parental care of the Slate-crowned Antpitta (*Grallaricula nana*) in northeastern Ecuador. *Orn. Neotrop.* 19: 457–461.
- Greeney, H. F. & Nunnery, T. 2006. Notes on the breeding of north-west Ecuadorian birds. *Bull. Br. Orn. Cl.* 126: 38–45.
- Greeney, H. F. & Rombough, C. J. F. 2005. The nest of the Chusquea Tapaculo (*Scytalopus parkeri*) in southern Ecuador. *Orn. Neotrop.* 16: 439–440.
- Greeney, H. F. & Sornoza, F. 2005. The nest and egg of the Slate-crowned Antpitta (*Grallaricula nana*), with observations on incubation behavior in southern Ecuador. *Orn. Neotrop.* 16: 137–140.
- Greeney, H. F., Gelis, R. A. & White, R. 2004. Notes on breeding birds from an Ecuadorian lowland forest. *Bull. Br. Orn. Cl.* 124: 28–37.
- Greeney, H. F., Bucker, A. D. L. & Harbers, N. 2005a. Parental care of the Blackish Tapaculo (*Scytalopus latrans*) in northeastern Ecuador. *Orn. Neotrop.* 16: 283–286.
- Greeney, H. F., Martin, P. R., Lysinger, M., Dobbs, R. C. & Gelis, R. A. 2005b. Notes on the breeding of *Basileuterus* warblers in Ecuador. *Bull. Brit. Orn. Cl.* 125: 129–135.
- Greeney, H. F., Sherman, N., Lynch, R. & Harms, I. 2007. The nest and eggs of Maroon-chested Ground Dove *Claravis mondetoura* in south-east Ecuador. *Cotinga* 28: 71–73.

- Greeney, H. F., Dobbs, R. C., Martin, P. R. & Gelis, R. A. 2008a. The breeding biology of *Grallaria* and *Grallaricula antipittas*. *J. Field Orn.* 79: 113–129.
- Greeney, H. F., Jaffe, D. F. & Manzaba B., O. G. 2008b. Incubation behavior of the Yellow-billed Cacique (*Amblycercus holosericeus*) in eastern Ecuador. *Orn. Colombiana* 7: 83–87.
- Greeney, H. F., Martin, P. R., Dobbs, R. C., Gelis, R. A., Bücken, A. D. L. & Montag, H. 2008c. Nesting ecology of the Spectacled Whitestart (*Myioborus melanocephalus*) in Ecuador. *Orn. Neotrop.* 19: 335–344.
- Guerrero, F. T. 1996. *Aves del bosque de Mazán*. Empresa Pública Municipal de Teléfonos, Agua Potable y Alcantarillado, Cuenca.
- Juiña, M. E., Harris, J. B. C. & Greeney, H. F. 2009. Description of the nest and parental care of the Chestnut-naped Antpitta (*Grallaria nuchalis*) from southern Ecuador. *Orn. Neotrop.* 20: 305–310.
- Marchant, S. 1959. The breeding season in S. W. Ecuador. *Ibis* 101: 137–187.
- Marchant, S. 1960. The breeding of some southwestern Ecuadorian birds. *Ibis* 102: 349–382, 584–599.
- Marín, M. & Carrión B., J. M. 1994. Additional notes on nest and eggs of some Ecuadorian birds. *Orn. Neotrop.* 5: 121–124.
- Rasmussen, J. F., Rahbek, C., Poulsen, B. O., Poulsen, M. K. & Bloch, H. 1996. Distributional records and natural history notes on threatened and little known birds of southern Ecuador. *Bull. Brit. Orn. Cl.* 116: 26–45.
- Ridgely, R. S. & Greenfield, P. J. 2001. *The birds of Ecuador*. Cornell Univ. Press, Ithaca, NY.
- Schulenberg, T. S. & Gill, F. B. 1987. First description of the nest of the Olive Finch, *Lysurus castaneiceps*. *Condor* 89: 673–674.
- Slater, P. L. & Salvin, O. 1879. On the birds collected by T. K. Salmon in the state of Antioquia, United States of Colombia. *Proc. Zool. Soc. Lond.* 1879: 486–550.
- Skutch, A. F. 1954. *Life histories of Central American birds*. Pacific Coast Avifauna 31. Cooper Orn. Soc., Berkeley, CA.
- Skutch, A. F. 1972. *Studies of tropical American birds*. Publ. Nuttall Orn. Cl. No. 10. Nuttall Orn. Cl., Cambridge, MA.
- Solano-Ugalde, A., Arcos-Torres, A. & Greeney, H. F. 2007. Additional breeding records for selected avian species in northwest Ecuador. *Bol. Soc. Antioqueña Orn.* 17: 17–25.
- Addresses:* Harold F. Greeney, Mery E. Juiña J. & Alejandro Solano-Ugalde, Yanayacu Biological Station and Center for Creative Studies c/o Foch 721 y Amazonas, Quito, Ecuador. J. Berton C. Harris, Michael T. Wickens & Ben Winger, Fundación de Conservación Jocotoco, Av. Los Shyris N37-146 y El Comercio, Quito, Ecuador. JBCH currently at: Research Institute for Climate Change and Sustainability, School of Earth and Environmental Sciences, University of Adelaide, SA 5005, Australia. Rudy A. Gelis, Pluma Verde Tours, Pasaje Manuel García y 18 de Septiembre N20-28, Quito, Ecuador. Eliot T. Miller, Harris World Ecology Center, Department of Biology, University of Missouri, St Louis, Missouri, 63121, USA.